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10/511,830	10/20/2004	Akihiko Yoneya	260452US2PCT	8842

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EXAMINER	
PHAN, TRI H	

ART UNIT	PAPER NUMBER
2616	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/511,830	YONEYA, AKIHIKO	
	Examiner	Art Unit	
	TRI H. PHAN	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 October 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 October 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/20/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Communication(s)

1. This office action is in response to the Application filed on October 20th, 2004. Claims 1-9 are now pending in the application.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

3. The drawings are objected to because all blocks in Figures 1-17 should be labeled with descriptive legends based on 37 C.F.R. § 1.84(o) for supporting the objection in the Rules and M.P.E.P. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

4. Claims 1 and 3 are objected to because of the following informalities:

In claim 1, line 4, the term "etc." should be removed.

In claim 3, line 4, the term "etc." should be removed.

Appropriate corrections are required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Tsurumi et al.** (U.S.6,334,051; hereinafter refer as '**Tsurumi**') in view of **Haapoja et al.** (U.S.2002/0127982; hereinafter refer as '**Haapoja**').

- In regard to claim 1, **Tsurumi** discloses *an image signal cancel-type heterodyne reception method* (for example see fig. 1; col. 1, lines 22-35)*, which comprises the steps of*

mixing a high-frequency signal received by an antenna ('antenna 10' in fig. 1; col. 1, lines 51-61; col. 4, lines 49-60) *and amplified with locally oscillated two-phase output signals of a first local oscillator which have different phases, to generate two-phase intermediate-frequency signals* ('local oscillator 14' in fig. 1; col. 1, lines 51-61; col. 4, lines 49-60; col. 5, lines 4-17; wherein the two signals are 90 degrees out of phase with each other)*;*

summing a pair of modulated signals of the two-phase intermediate-frequency signals which are modulated using two modulating orthogonal signals which are orthogonal to each other, to generate one synthesized signal ('adder 20/76' in figs. 1, 6, 9; for example see col. 4, lines 49-60; col. 6, lines 3-11; col. 9, lines 31-40)*;*

amplifying the synthesized signal to generate an intermediate-frequency amplifier output signal (for example see col. 4, lines 49-60; wherein the amplifier is not showed). **Tsurumi** does disclose wherein the DSP incorporates all functions of quadrature, demodulation, channel selection, and frequency synthesis as disclosed in col. 8, lines 49-54; but fails to explicitly disclose the "*second local oscillator*" for modulating and mixing the IF signals to generate the base-band signals from which image signals have been cancelled. However, such limitation lacks thereof from **Tsurumi** reference is well known and disclosed by **Haapoja**.

In an analogous art, **Haapoja** discloses a system and method for single-carrier and multiple-carrier receiver, which uses the signal selection with the DSP (for example see signal selection block 220A, e.g. "*second local oscillator*", and DSP 180 in figs. 3, 7) for modulating and mixing the IF signals with different phases for cancelling image signals and to generate the desired base-band signals, e.g. "*modulating ... and mixing them with locally oscillated two-phase output signals of a second local oscillator ..., to generate desired base-band signals from which image signals have been canceled, thus demodulating the base-band signals*", as disclosed in page 4, para [0045, 0049].

Thus, it would have been obvious to those skilled in the art at the time of the invention was made to incorporate **Haapoja**'s signal selection with the DSP in place of **Tsurumi**'s DSP of the receiver to arrive the claimed invention with a motivation to improve image cancelling in a multiple-carrier receiver as disclosed in page 4, para [0049].

- Regarding claim 3, **Tsurumi** discloses a*n image signal cancel-type heterodyne reception method* (for example see fig. 1; col. 1, lines 22-35)*, which comprises the steps of*

mixing a high-frequency signal received by an antenna ('antenna 10' in fig. 1; col. 1, lines 51-61; col. 4, lines 49-60) *and amplified with locally oscillated two-phase output signals of a first local oscillator which have different phases, to generate two-phase intermediate-frequency signals* ('local oscillator 14' in fig. 1; col. 1, lines 51-61; col. 4, lines 49-60; col. 5, lines 4-17; wherein the two signals are 90 degrees out of phase with each other);

summing a pair of modulated signals of the two-phase intermediate-frequency signals which are modulated using two modulating orthogonal signals which are orthogonal to each other, to generate one synthesized signal ('adder 20/76' in figs. 1, 6, 9; for example see col. 4, lines 49-60; col. 6, lines 3-11; col. 9, lines 31-40);

amplifying the synthesized signal to generate an intermediate-frequency amplifier output signal (for example see col. 4, lines 49-60; wherein the amplifier is not showed). **Tsurumi** does disclose wherein the DSP incorporates all functions of quadrature, demodulation, channel selection, and frequency synthesis as disclosed in col. 8, lines 49-54; but fails to explicitly disclose the "*second local oscillator*" for modulating and mixing the IF signals to generate the base-band signals from which image signals have been cancelled. However, such limitation lacks thereof from **Tsurumi** reference is well known and disclosed by **Haapoja**.

In an analogous art, **Haapoja** discloses a system and method for single-carrier and multiple-carrier receiver, which uses the signal selection with the DSP (for example see signal selection block 220A, e.g. "*second local oscillator*", and DSP 180 in figs. 3, 7) for modulating and mixing the IF signals with different phases for cancelling image signals and to generate the desired base-band signals, e.g. "*modulating the intermediate-frequency amplifier output signal ... by modulating two-phase output signals of a second local oscillator ..., to generate a desired*

base-band signal from which an image signal has been canceled, thus demodulating the base-band signal", as disclosed in page 4, para [0045, 0049].

Thus, it would have been obvious to those skilled in the art at the time of the invention was made to incorporate **Haapoja**'s signal selection with the DSP in place of **Tsurumi**'s DSP of the receiver to arrive the claimed invention with a motivation to improve image cancelling in a multiple-carrier receiver as disclosed in page 4, para [0049].

- In regard to claims 2 and 4, **Tsurumi** further discloses, *wherein signals of two frequency bands which act as an image signal to each other are received simultaneously* (for example see col. 1, lines 22-50; col. 7, line 56 through col. 8, line 2).

- Regarding claims 5 and 6, **Tsurumi** further discloses, *wherein sine waves whose phases are shifted by 90 degree from each other are used as the two modulating orthogonal signals which are orthogonal to each other* (for example see col. 5, lines 4-17; col. 6, lines 3-11). **Tsurumi** fails to explicitly disclose, wherein *two-valued signals having sequences [1, -1, 1, -1, 1, 1, -1, -1] and [1, 1, -1, -1, 1, -1, 1, -1] respectively are used* as the two modulating orthogonal signals which are orthogonal to each other; however, since two signals are different with each other by 90-degree, it is obvious that theirs values are 1 and -1 different and sequence respectively.

Thus, it would have been obvious to those skilled in the art at the time of the invention was made to provide digitized values in place of **Tsurumi**'s system to arrive the claimed invention with a motivation to provide differential values for signal line digital processing.

- In regard to claim 7, **Haapoja** discloses *a direct conversion orthogonal frequency division multiplexing reception method* (for example see figs. 3 and 7; page 2, para [0019]), *which comprises the steps of*

modulating a high-frequency signal modulated by orthogonal frequency division multiplexing, by using two-phase output signals of a local oscillator ('local oscillator 260' in fig. 3) *whose frequencies are equal to a center frequency of a receive signal and whose phases are shifted by 90 degree from each other, to generate two-phase base-band signals* (for example see figs 2-3; Abstract; page 2, paras [0017-0018]; pages 3-4, paras 0041-0042]; wherein the I and Q signals are different 90 degree as disclosed in page 4, para 0043]);

summing a pair of modulated signals of the two-phase base-band signals which are modulated using two modulating orthogonal signals which are orthogonal to each other, to generate one synthesized signal ('adders 221' in fig. 3; for example see figs. 3 and 7; page 4, para [0045-0046]);

amplifying the synthesized signal to generate a synthesized-signal amplifier output signal (for example see page 5, para [0058]; wherein the DSP amplifies the gain power, e.g. "*amplifying the synthesized signal*", as disclosed). **Haapoja** does disclose about the digital signal processing unit 'DSP'; but fails to explicitly disclose the modulating and demodulating method for DSP. However, such limitation lacks thereof from **Haapoja** reference is well known and disclosed by **Tsurumi**.

In an analogous art, **Tsurumi** discloses, a system and method for a direct conversion receiver for *modulating the synthesized-signal amplifier output signal by using the modulating*

orthogonal signals (elements 16 and 72 in figs. 1, 6, and 9; for example see col. 5, lines 18-33; col. 7, line 56 through col. 8, line 2)*; and based on a result of performing Fourier transform on the modulated synthesized-signal amplifier output signal, performing demodulation against the orthogonal frequency division multiplexing* ('demodulation section 102' in fig. 2; for example see col. 4, line 61-66; col. 8, lines 4-54).

Thus, it would have been obvious to those skilled in the art at the time of the invention was made to incorporate **Tsurumi**'s demodulation section with the DSP in place of **Haapoja**'s DSP of the receiver to arrive the claimed invention with a motivation to flexibly adaptable to radio systems with different frequency and band as disclosed in col. 2, lines 49-56.

- Regarding claim 8, **Haapoja** discloses a *direct conversion orthogonal frequency division multiplexing reception method* (for example see figs. 3 and 7; page 2, para [0019]), *which comprises the steps of*

modulating a high-frequency signal modulated by orthogonal frequency division multiplexing, by using two-phase output signals of a local oscillator ('local oscillator 260' in fig. 3) *whose frequencies are equal to a center frequency of a receive signal and whose phases are shifted by 90 degree from each other, to generate two-phase base-band signals* (for example see figs 2-3; Abstract; page 2, paras [0017-0018]; pages 3-4, paras 0041-0042]; wherein the I and Q signals are different 90 degree as disclosed in page 4, para 0043])*;*

summing a pair of modulated signals of the two-phase base-band signals which are modulated using two modulating orthogonal signals which are orthogonal to each other, to

generate one synthesized signal ('adders 221' in fig. 3; for example see figs. 3 and 7; page 4, para [0045-0046]):

amplifying the synthesized signal to generate a synthesized-signal amplifier output signal (for example see page 5, para [0058]; wherein the DSP amplifies the gain power, e.g. "*amplifying the synthesized signal*", as disclosed). **Haapoja** does disclose about the digital signal processing unit 'DSP'; but fails to explicitly disclose the demodulating method for DSP. However, such limitation lacks thereof from **Haapoja** reference is well known and disclosed by **Tsurumi**.

In an analogous art, **Tsurumi** discloses, a system and method for a direct conversion receiver for *performing demodulation against the orthogonal frequency division multiplexing based on a result of performing Fourier transform on the modulated synthesized-signal amplifier output signal* ('demodulation section 102' in fig. 2; for example see col. 4, line 61-66; col. 8, lines 4-54).

Thus, it would have been obvious to those skilled in the art at the time of the invention was made to incorporate **Tsurumi**'s demodulation section with the DSP in place of **Haapoja**'s DSP of the receiver to arrive the claimed invention with a motivation to flexibly adaptable to radio systems with different frequency and band as disclosed in col. 2, lines 49-56.

- In regarding claim 9, **Haapoja** further discloses *wherein signals respectively are used as the two modulating orthogonal signals which are orthogonal to each other* (for example see page 4, para [0043]); but fails to explicitly disclose *wherein three-valued signals having sequences [0, 1, 0, -1] and [1, 0, -1, 0]*. However, since two signals, i.e. I and Q signals, are

different with each other by 90-degree through the center carrier signal; thus, it is obvious that theirs values are 1 -1 and 0 different and sequence respectively.

Thus, it would have been obvious to those skilled in the art at the time of the invention was made to provide digitized values in place of **Haapoja**'s system to arrive the claimed invention with a motivation to provide differential values for signal line digital processing.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kawai, Kazuo (U.S.5,870,669) and **JAN CROLS** ("A Single-Chip 900 MHz CMOS Receiver Front-End with a High Performance Low-IF Topology",1995, IEEE Journal of Solid-State Circuits, Vol. 30, No. 12, 12-1995, pages1483-1492) are all cited to show devices and methods for improving image-cancellation for receiver in telecommunication architectures, which are considered pertinent to the claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tri H. Phan, whose telephone number is (571) 272-3074. The examiner can normally be reached on M-F (8:00-4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chi H. Pham can be reached on (571) 272-3179.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(571) 273-8300

Hand-delivered responses should be brought to Randolph Building, 401 Dulany Street, Alexandria, VA 22314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office, whose telephone number is (571) 272-2600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Tri H. Phan/
April 7, 2008